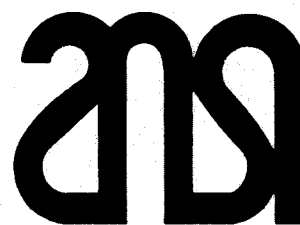


Voluntary Product Standard

PS 61-74

U.S. DEPARTMENT OF COMMERCE/National Bureau of Standards

PLASTIC CONTAINERS (JERRY-CANS) FOR PETROLEUM PRODUCTS



American National
Standards Institute

American National Standard MH 17.1-1974

UNITED STATES DEPARTMENT OF COMMERCE

NATIONAL BUREAU OF STANDARDS • Richard W. Roberts, *Director*

VOLUNTARY PRODUCT STANDARD
PS 61-74

Plastic Containers (Jerry-Cans)
for
Petroleum Products

Approved by the American National Standards Institute on
November 21, 1974, as American National Standard MH17.1-1974

Abstract

This Voluntary Product Standard covers requirements and methods of test for the material, design, and properties of plastic containers (jerry-cans) intended for use with petroleum products. Methods of identifying containers that conform to the requirements of the standard are included.

Key words: Containers for petroleum products; jerry-cans; petroleum products, containers for; plastic containers for petroleum products.

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VOLUNTARY PRODUCT STANDARDS

Voluntary Product Standards are developed under procedures published by the Department of Commerce in Part 10, Title 15, of the Code of Federal Regulations. The purpose of the standards is to establish nationally recognized requirements for products, and to provide all concerned interests with a basis for common understanding of the characteristics of the products. The National Bureau of Standards administers the *Voluntary Product Standards* program as a supplement to the activities of the private sector standardizing organizations.

Establishment of a VOLUNTARY PRODUCT STANDARD

The role of the National Bureau of Standards in the establishment of a *Voluntary Product Standard* is to (1) act as an unbiased coordinator in the development of the standard, (2) provide editorial assistance in the preparation of the standard, (3) supply such assistance and review as is required to assure the technical soundness of the standard, (4) seek satisfactory adjustment of valid points of disagreement, (5) determine the compliance with the criteria of the Department's procedures, (6) provide secretarial functions for each committee appointed under the Department's procedures, and (7) publish the standard as a public document.

Producers, distributors, users, consumers, and other interested groups contribute to the establishment of a *Voluntary Product Standard* by (1) initiating and participating in the development of the standard, (2) providing technical or other related counsel as appropriate relating to the standard, (3) promoting the use of and support for the standard, and (4) assisting in keeping the standard current with respect to advancing technology and marketing practices.

Use of a VOLUNTARY PRODUCT STANDARD

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The benefits derived from *Voluntary Product Standards* are in direct proportion to their general recognition and actual use. Producers and distributors whose products meet the requirements of a Voluntary Product Standard may refer to the standard in advertising and on labels to promote greater public understanding of or confidence in their products. Purchasers may order products conforming to the requirements of the standards.

For copies of the *Voluntary Product Standards* procedures or for more information concerning the development and use of these standards, you may write to: Office of Engineering Standards Services; National Bureau of Standards; Washington, D.C. 20234.

PLASTIC CONTAINER (JERRY-CANS)

FOR

PETROLEUM PRODUCTS

Effective May 1, 1975 (See section 5.)

(This Standard, which was initiated by the Plastic Jerry-Can Committee of The Society of the Plastics Industry, Inc., has been developed under the *Procedures for the Development of Voluntary Product Standards* of the U.S. Department of Commerce. See Section 6, *History of Project*, for further information.)

1. PURPOSE

The purpose of this Voluntary Product Standard is to establish nationally recognized quality requirements for plastic containers (jerry-cans) intended for use with petroleum products. This Standard is intended to provide producers, distributors, users, and code officials with a basis for a common understanding of the characteristics of the product.

2. SCOPE

This Voluntary Product Standard covers plastic containers (jerry-cans) intended for use in and around the home or recreation area for the temporary storage of petroleum products.¹ The Standard is not intended to cover portable marine fuel tanks. Included in the Standard are requirements and methods of test for the material, design, and performance properties of the containers. Methods of identifying containers that conform to the requirements of the Standard are provided.

Note: As an aid in correlating U.S. customary units to metric units, conversion factors for the units used in this Standard are given in the appendix.

3. REQUIREMENTS

3.1. General—Products represented as complying with this Voluntary Product Standard shall meet all of the requirements specified herein.

3.2. Materials—The container shall be fabricated from any plastic material meeting the following requirements.

3.2.1. Vicat softening point—The material shall have a minimum Vicat softening point of 235 °F when tested in accordance with 4.3.

3.2.2. Brittleness temperature—The material shall have a brittleness temperature not higher than -40 °F when tested in accordance with 4.4.

3.2.3. Flammability—The material shall not have a burning rate greater than 1.0 inch per minute when tested in accordance with the American Society for Testing and Materials (ASTM) ASTM D 635-72, *Standard Method of Test for Flammability of Self-Supporting Plastics*.²

3.3. Aging—The material from the container shall retain at least 70 percent of its original tensile strength when tested in accordance with 4.5.

3.4. Capacity—The containers shall have a nominal capacity of 7 gallons or less in 1/2-gallon increments. The full capacity, measured at 75 ± 5 °F at the level of the lowest opening when the container is standing in its normal upright position, shall be at least 5 percent greater than the nominal capacity.

3.5. Stability—Each container shall be so designed that it shall not upset when placed facing any direction on a plane inclined at 20° with the horizontal when filled to its nominal capacity.

3.6. Pouring opening and closures—Each container shall be provided with a pouring opening and a closure. The pouring opening shall have an integral pouring nozzle, or shall be designed to accept a pouring nozzle supplied with the container. The container may be provided with a vented pouring nozzle or other pouring vents. The nozzle shall not leak when liquid is poured from the container. The closures for the pouring opening and vents shall be made of metal or plastic material which is resistant to petroleum products. The closure shall not leak when tested in accordance with 4.6.

² Later issues of the ASTM publications referenced in this Standard may be used providing the requirements are applicable and consistent with the issue designated. Copies of ASTM publications are available from the American Society for Testing and Materials, 1916 Race Street, Philadelphia, Pa. 19103.

¹ For the purpose of this Standard "temporary" is considered to mean short term such as 30-90 days.

3.7. Handle—Each container shall be provided with a handle suitable for use in carrying the filled container. The handle shall be an integral part of the container or shall be securely fastened thereto. The handle shall not crack or become loosened or detached from the container when tested in accordance with 4.7.

3.8. Drop strength—The container shall show no evidence of rupture, cracks, or leakage when tested in accordance with 4.8.

3.9. Hydrostatic pressure—The container shall show no evidence of rupture, cracks, or leakage when tested in accordance with 4.9.

3.10. Permeability—The filled container shall not have a weight loss greater than 3 percent when tested in accordance with 4.10.

3.11. Petroleum resistance—The material from the container shall show no pitting, crazing, softening, bubbling, cracking, tackiness, or decomposition when tested in accordance with 4.11.1. The material shall retain at least 60 percent of its tensile strength and elongation when tested in accordance with 4.11.2.

3.12. Flammability and elevated temperature resistance—The container shall not leak when tested in accordance with 4.12. Any burning that occurs during the test specified in 4.12.a, shall not continue for more than 5 seconds.

3.13. Stress cracking—(This requirement applies only to containers made of molded polyethylene.) The container shall not crack when tested in accordance with 4.13.

3.14. Color—Each container shall be essentially opaque. If colored, the pigment shall not affect or be affected by petroleum products. The preferred color is red; however, State and local regulations may specify an alternate color.

3.15. Marking—Each container shall be labeled in accordance with the regulations issued pursuant to the Federal Hazardous Substances Act³ and with State and local regulations. In addition, each container shall be clearly and permanently marked with the following:

- (a) The manufacturer's name or trademark,
- (b) the nominal capacity in gallons, and
- (c) the designation of this Voluntary Product Standard, PS 61-74.

4. INSPECTION AND TEST PROCEDURES

4.1. General—The inspection and test procedures contained in this section are to be used to determine the conformance of products to the requirements of this Voluntary Product Standard. Each producer or distributor who represents his

product as conforming to this Standard may utilize statistically based sampling plans which are appropriate for each particular manufacturing process but shall keep such essential records as are necessary to document with a high degree of assurance his claim that the requirements of the Standard have been met. Additional sampling and testing of the product, as may be agreed upon between purchaser and seller, is not precluded by this section.

4.2. Conditioning and test conditions—The test specimens shall be conditioned and tested in accordance with Procedure A of ASTM D 618-61, *Standard Methods of Conditioning Plastics and Electrical Insulating Materials for Testing*,⁴ unless otherwise specified herein.

4.3. Vicat softening point—The minimum softening shall be determined in accordance with ASTM D 1525-70, *Standard Method of Test for Vicat Softening Point of Plastics*,⁴ using Rate A.

4.4. Brittleness temperature—The brittleness temperature shall be determined in accordance with ASTM D 746-72, *Standard Method of Test for Brittleness Temperature of Plastics and Elastomers by Impact*.⁴

4.5. Aging—The following two tests shall be performed; in both tests, tensile strength shall be determined in accordance with ASTM D 1708-66, *Standard Method of Test for Tensile Properties of Plastics by Use of Microtensile Specimens*⁴ or ASTM D 638-72, *Standard Method of Test for Tensile Properties of Plastics*,⁴ using 5 specimens and speed C:

a. The specimens shall be tested for 1,000 hours in accordance with Procedure B of ASTM D 2565-70, *Standard Recommended Practice for Operating Xenon Arc-Type (Water-Cooled) Light- and Water-Exposure Apparatus for Exposure of Plastics*,⁴ using type B or BH apparatus. The test cycle shall consist of 102 minutes of light followed by 18 minutes of light and spray.

b. The specimens shall be tested for 60 days in accordance with ASTM D 794-68, *Standard Recommended Practice for Determining Permanent Effect of Heat on Plastics*⁴; except that, the oven temperature shall be $189 \pm 5^\circ\text{F}$.

4.6. Closure test—The container shall be filled to its nominal capacity with water at $75 \pm 5^\circ\text{F}$ and the closures shall be secured. The filled container shall then be tested in accordance with Procedure A of ASTM D 999-68, *Standard Method of Vibration Test for Shipping Containers*,⁴ for 2 hours. After the 2-hour test, the container shall be inverted for 5 minutes without tightening the closures.

³ Copies of these regulations are available from the Division of Information and Education, Consumer Product Safety Commission, Washington, D.C. 20207.

⁴ See footnote 2, page 1.

4.7. Handle strength—The container shall be filled to its nominal capacity with water, and the closures shall be secured. One end of a 6-foot free length of $\frac{3}{8}$ -inch manila rope shall be secured to a rigid point of suspension and the other end of the rope to the handle. The container shall be suspended from this rope for 1 minute. Then it shall be raised 12 inches from the suspended position and allowed to fall freely.

4.8. Drop strength—The container shall be filled to its nominal capacity with water at $75 \pm 5^\circ\text{F}$ and the closure shall be secured. It shall be dropped, free fall, onto a flat, solid surface. Drops shall be made in the following sequence: one drop on the bottom, one drop on a bottom corner, and one drop on a side. The distance of fall shall be 8 feet. The same tests shall be made with another container filled with a blend of 50 percent glycol and 50 percent water and with both the container and its contents cooled to $0 \pm 2^\circ\text{F}$. For these latter tests, the distance of fall shall be 4 feet.

4.9. Hydrostatic pressure test—The container shall be filled to its nominal capacity with water at $75 \pm 5^\circ\text{F}$ and the closures shall be secured. The internal pressure shall be increased to 20 psig and maintained for 2 minutes. The same test shall be conducted with a container filled to its nominal capacity with water at $140 \pm 5^\circ\text{F}$. The application of pressure shall be made by inserting and securing an adapter through a drilled hole in a flat, heavy section of the container wall, and not on a pinch-off or parting line.

4.10. Permeability—The container shall be filled to its nominal capacity with reference fuel "B" (a mixture of 70 percent iso-octane and 30 percent toluene by volume), as defined in ASTM D 471-72, *Standard Method of Test for Change in Properties of Elastomeric Vulcanizates Resulting From Immersion in Liquids*,⁵ and the closures shall be secured. The filled container shall be accurately weighed. After storage for 30 days in a room temperature of $75 \pm 5^\circ\text{F}$, the container shall be reweighed, and the percent of weight loss shall be calculated.

4.11. Petroleum resistance—

4.11.1. Visual test—Upon completion of the permeability test in 4.10, the container shall be emptied and cut apart in a manner to allow visual inspection of all interior surfaces.

4.11.2. Immersion test—Approximately 40 specimens, approximately 5 inches by $\frac{5}{8}$ inch shall be conditioned at $73.4 \pm 3.6^\circ\text{F}$ for 18 hours. The specimens shall be immersed in the following solutions at $100 \pm 5^\circ\text{F}$; at least 20 specimens shall be immersed in each solution:

a. ASTM reference fuel "C" (mixture of 50 percent iso-octane and 50 percent toluene by volume);

b. Blend of ASTM reference fuel "A" (iso-octane) and ASTM reference oil No. 3 (considered to be representative of low aniline point automotive lubricating oils, defined by ASTM D 471-72, *Change in Properties of Elastomeric Vulcanizates Resulting from Immersion in Liquid*⁵) in a ratio of 16 to 1 by volume.

Following exposure for 30 days, 10 specimens shall be removed from each solution and tested to determine tensile strength and elongation in accordance with ASTM D 1708-66 or ASTM D 638-72 using speed C. The test may be discontinued at this point if the results show not less than 85 percent retention of tensile strength and elongation. Otherwise, the test shall be repeated on 10 specimens which have been immersed for a total of 60 days to determine conformance with 3.11.

4.12. Flammability and elevated temperature resistance—Two tests shall be performed:

a. A container shall be completely filled with water at $75 \pm 5^\circ\text{F}$. A $\frac{3}{8}$ -inch-diameter Bunsen burner, using natural gas having a calorific value of approximately 1000 btu per cubic foot, shall be adjusted so that the outer blue flame is 1 inch in length and the inner blue cone is $\frac{3}{8}$ inch long. The temperature of the flame just above the inner cone shall be a minimum of 1700°F and the temperature of the flame $\frac{3}{4}$ inch above the burner shall be a minimum of 550°F . The burner shall be tilted at an 18° angle and placed so that the closest edge of the tip is $\frac{3}{4}$ inch from the bottom of the container. The burner shall remain in this position for 75 seconds. The container shall then be examined for leaks. This test shall be repeated on the side and on any corner of the container. Following each test, the container shall be examined for leaks.

b. A container shall be completely filled with water at $75 \pm 5^\circ\text{F}$. A $\frac{1}{2}$ -inch-diameter steel rod, 6 inches long, shall be heated to $500 \pm 10^\circ\text{F}$ and immediately placed lengthwise on the bottom of an inverted container where it shall be allowed to cool to $75 \pm 5^\circ\text{F}$. This procedure shall be repeated; except that the heated rod shall be placed lengthwise on the side wall of the container after the container has been placed on its side. The container shall be examined for leaks.

4.13. Stress cracking—Two containers shall be tested in accordance with procedure B of ASTM D 2561-70, *Standard Method of Test for Environmental Stress-Crack Resistance of Blow-Molded Polyethylene Containers*,⁵ except that, the outside of the containers shall not be exposed to the stress-cracking agent.

5. EFFECTIVE DATE AND IDENTIFICATION

The effective date of this Standard is May 1, 1974. As of the effective date, reference to PS 61-

⁵ See footnote 2, page 1.

74, may be made in contracts, codes, advertising, invoices, product labels, and the like, but no product may be advertised or represented in any manner which would imply or tend to imply approval or endorsement of that product by the National Bureau of Standards, the Department of Commerce, or by the Federal Government.

The following statements are suggested for use in representing products as conforming to all requirements of this Standard:

- (1) "This container conforms to all requirements established in Voluntary Product Standard PS 61-74, developed and published in accordance with the U.S. Department of Commerce *Procedures for the Development of Voluntary Product Standards*. Full responsibility for the conformance of this product to the standard is assumed by (name and address of producer or distributor)."
- (2) "Conforms to PS 61-74, (name and address of producer or distributor)."

6. HISTORY OF PROJECT

In 1964 The Society of the Plastics Industry, Inc., requested the assistance of the Department of Commerce in establishing a Voluntary Product Standard for plastic containers for petroleum products. In September 1965, a draft proposal was circulated for comment. After an extensive amount of testing, and several committee ballots, changes were made to the standard which were based upon performance. A new draft was developed by the Standard Review Committee in March 1973. In June 1973, public announcement was made, and the recommended Voluntary Product Standard was widely circulated for acceptance. The response to this circulation indicated that certain changes were necessary. The standard was again circulated for acceptance in January 1974 and the response indicated a consensus of acceptability as defined in the *Procedures for the Development of Voluntary Product Standards*.

Accordingly, the Standard designated PS 61-74, *Plastic Containers (Jerry-Cans) for Petroleum Products*, was approved for publication by the National Bureau of Standards to be effective May 1, 1974.

Technical Standards Coordinator:

Karl G. Newell, Jr.

Standards Development Services Section,
National Bureau of Standards,
Washington, D.C. 20234

7. STANDING COMMITTEE

A Standing Committee has been appointed to assist in keeping this Voluntary Product Standard up to date. The names of the members of the committee are available from the Standards Development Services Section, Washington, D.C. 20234, which serves as secretariat for the committee.

APPENDIX—Metric Conversion

The conversion factors and units contained in this appendix are in accordance with the International System of Units (abbreviated SI for *Système International d'Unités*). The SI was defined and given official status by the 11th General Conference on Weights and Measures which met in Paris in October 1960. For assistance in converting U.S. customary units to SI units, see ASTM E 380, *ASTM Standard Metric Practice Guide*, available from the American Society for Testing and Materials, 1916 Race Street, Philadelphia, Pa. 19103. The conversion factors for the units found in this Standard are as follows:

- 1 inch = 25.4 millimeters
- 1 gallon = 3.8 liters
- 1 pound = 0.454 kilogram
- $t_C = (t_F - 32)/1.8$

where:

- t_C = temperature in degrees Celsius
- t_F = temperature in degrees Fahrenheit

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